

REMARKS/ARGUMENTS

Favorable reconsideration of this application as presently amended and in light of the following discussion is respectfully requested.

Claims 1, 3-6, 12, 13, 15 and 16 are presently active in this case, Claims 1, 3 and 12 amended, Claims 2, 7-11 and 14 canceled by way of the present amendment.

In the outstanding Office Action, Claims 1 and 6 were rejected on the ground of nonstatutory double patenting over U.S. Patent No. 7,406,852B2; Claims 1, 2, 3, 12 and 14 were rejected under 35 U.S.C. § 112, second paragraph as being indefinite; Claims 1-3, 5, 12-15 were rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. 6,427,326A1 to Soga et al. and U.S. 5,626,522 to Nielsen; Claims 8-10 were rejected under 35 U.S.C. 103(a) as being unpatentable over Soga et al. and further in view of U.S. 2006/005395A1 to Sawada; Claim 11 was rejected under 35 U.S.C. 103(a) as being unpatentable over Soga et al. and further in view of U.S. 2004/00461142A1 to Wilson et al.; Claim 4 was rejected under 35 U.S.C. 103(a) as being unpatentable over Soga et al. and further in view of JP 2000144211A; Claims 6 and 16 were rejected under 35 U.S.C. 103(a) as being unpatentable over Soga et al. and further in view of U.S. 1,434,190 to Bird et al.

With regard to the §112, second paragraph, rejections, Claim 1 has been amended to change the expression of "...hold the scheduled diameter-expanding portion in a buckle preventing state" to "hold the scheduled diameter-expanding portion so as to prevent buckling of the scheduled diameter-enlargcd portion when the scheduled diameter-enlargina portion is pressed in the axial direction." As described in paragraphs [0041] and [0129] of Applicants' published application (US200710107484A1), by holding the scheduled diameter-expanding portion so as to prevent buckling of the scheduled diameter-enlarged portion when

the scheduled diameter-enlarging portion is pressed in the axial direction, buckling of the scheduled diameter-expanding portion of the raw material (which may occur at the time of pressing the scheduled diameter-expanding portion with punches) can be prevented. This prevents occurrence of defective shapes such as wrinkles and/or blushing blemishes, which in turn can exert such advantageous effects that higher-grade forged products can be obtained.

With regard to Claim 3, in general, a “buckle limit length” is defined as a minimum length at which a bar-shaped member will undergo buckling when the member is pressed under a predetermined pressing force in the axial direction. That is, the buckle limit length is “the minimum length at which buckling occurs in the exposed portion of the raw material when the scheduled diameter-expanding portion of the raw material is pressed under predetermined pressing force with the punch in the axial direction of the raw material.”

Claim 3 is amended to include this clarifying language. This buckle limit length depends on the cross-sectional area of the bar-shaped material. For example, as the cross-sectional area of the bar-shaped member becomes larger, the buckle limit length usually becomes longer. Applicants submit that this is well-known to a person with ordinary skill in the forging (upset forging) technical field, to which the present invention pertains. Further, the advantageous effect that occurrence of buckling in the exposed portion of the raw material can be prevented is described in paragraphs [0042] and [0130] of Applicants’ published application.

By way of the claim amendments and the discussion above, Applicants submit that the rejection under 35 U.S.C. §112, second paragraph is overcome.

Turning now to the merits, in order to expedite issuance of a patent in this case, Applicants have amended independent Claims 1 and 12 to clarify the patentable features of the present invention over the cited references. Specifically, amended Claim 1 recites a forging method for enlarging scheduled diameter-enlarging portions which are located at axial end portions of a bar-shaped raw material. The forging method includes the steps of

holding an axial intermediate portion of the raw material with a holding die in a state in which the axial intermediate portion is prevented from being enlarged in diameter, and the axial end portions of the raw material are disposed in respective forming dented portions provided at axial end portions of the holding die. A guide is provided in each dented portion of the holding die such that the scheduled diameter-enlarging portions are provided in insertion passages formed in the respective guides and the guides are axially movable within the dented portions. Also recited is simultaneously pressing the respective scheduled diameter-enlarging portions with punches in an axial direction of the raw material to fill the material of the scheduled diameter-enlarging portions in the forming dented portions while moving each guide in a direction opposite to a moving direction of each punch, thereby enlarging each scheduled diameter-enlarging portion in diameter. Each insertion passage is configured to hold the scheduled diameter-enlarging portion inserted therein so as to prevent buckling of the scheduled diameter-enlarging portion when the scheduled diameter-enlarging portion is pressed in the axial direction.

Thus, Claim 1, as amended, now includes simultaneously pressing the respective scheduled diameter-enlarging portions with punches in an axial direction of the raw material to fill the material of the scheduled diameter-enlarging portions in the respective forming dented portions while moving each guide in a direction opposite to a moving direction of each punch, thereby enlarging each scheduled diameter-enlarging portion in diameter. As discussed in Applicants' specification, this feature enables the scheduled diameter-expanding portions of the raw material are simultaneously enlarged in diameter, a forged product having diameter-enlarged portions at both axial ends can be produced efficiently, which enables reduction of production cost of the forged product (see paragraphs [0038] and [0126] of Applicants' published specification).

Furthermore, by moving each of the guides in a direction opposite to the corresponding punch moving direction while filling the material in the forming dented portion, the material flow in the forming dented portion can be dispersed. Therefore, the material will be filled in the corner portion of the forming dented portion without excessively increasing the forming pressure, which prevents occurrence of defect shapes such as material-lack defects (see paragraphs [0039] and [0127] of Applicants' specification. Furthermore, by moving both the guides in a direction opposite to the punch moving direction respectively, the load to be applied to the forming dented portion will decrease. This extends the service life of the forming dented portion (see paragraphs [0040] and [0128] of Applicants specification).

In addition, amended Claims 1 and 12 recite that each insertion passage is configured to hold the scheduled diameter-enlarging portion inserted therein so as to prevent buckling of the scheduled diameter-enlarged portion when the scheduled diameter-enlarging portion is pressed in the axial direction. As discussed in Applicants' specification, this feature enables to prevent the occurrence of buckling of the scheduled diameter-expanding portion which may occur at the time of pressing the scheduled diameter-expanding portion with punches. This prevents occurrence of defective shapes such as wrinkles and/or blushing blemishes, which in turn can exert such an advantageous effect that higher-grade forged products can be obtained (see paragraphs [0041] and [0129] of Applicants' specification).

In contrast, Soga, as shown in Figs. 16A-16D, both the scheduled diameter-expanding portions (W'a, W'b) of the raw material are pressed with the respective punches (3₁, 3₂, 4₁, 4₂), not in the axial direction of the raw material but in a direction perpendicular to the axial direction of the raw material. In other words, Soga is different from claim 1 in the pressing direction of the punch. Accordingly, fails to disclose the aforementioned feature of efficient

manufacture at reduced production cost, and extended the service life of the forming dented portion.

Furthermore, in Soga, as described in Column 11, lines 20-25, the guide (2b) is used to hold the intermediate die (22) in position on the lower die (2), and the guide (2b) does not have an insertion passage for holding the scheduled diameter-expanding portion so as to prevent buckling of the scheduled diameter-enlarged portion when the scheduled diameter-enlarging portion is pressed in the axial direction. Accordingly, Soga fails to disclose the aforementioned feature of preventing occurrence of defective shapes such as wrinkles and/or blushing blemishes, which in turn can exert such an advantageous effect that higher-grade forged products.

Nielsen is directed to a method of expanding a scheduled diameter-expanding portion of a bar-shaped raw material located at an axial one side thereof, and is not directed to a method of simultaneously expanding scheduled diameter-expanding portions of a bar-shaped raw material located at axial both sides thereof. Accordingly, Nielsen fails to disclose the aforementioned feature of efficient manufacture at reduced production cost, and extended the service life of the forming dented portion.

As discussed above, neither Soga nor Nielsen discloses the features or advantageous effects of the claimed invention. Accordingly, claim 1 is not obvious from Soga and Nielsen, and therefore should be allowed.

Claim 12, as amended, now includes features substantially as included in Claim 1. Thus Claim 12 is also allowable.

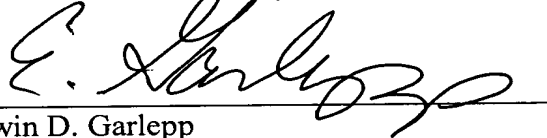
Claim 1 was rejected on the ground of nonstatutory double patenting over claim 1 of U.S. Patent 7,406,852 B2 (hereinafter, 852 patent). However, Applicant disagrees with the Examiner because claim 1 of the 852 patent includes the specific feature of “wherein a diameter expansion preventing protruded portion protruded in an axial direction of the guide

is integrally formed at a part of a tip end portion of the guide” which is not included in claim 1 of the present invention. Further, the ‘852 patent does not claim the amended features noted above.

Consequently, in view of the present amendment, no further issues are believed to be outstanding in the present application and the present application is believed to be in condition for formal allowance. An early and favorable action is therefore respectfully requested.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, P.C.

A handwritten signature in black ink, appearing to read 'E. Garlepp', is written over a horizontal line.

Edwin D. Garlepp
Attorney of Record
Registration No. 45,330